Listing of Claims

Claims 1-20 (canceled).

Claims 21-47:

21. (New) A method for synthesizing GPS satellite measurements for a declared location, comprising:

a. receiving network correction data for an epoch comprising:

i. Satellite ephemeris data;

ii. Satellite clock corrections;

iii. Satellite ephemeris corrections;

iv. Atmospheric parameters; and

v. residual error corrections derived from one or more reference stations located within a vernier-cell region;

b. determining whether the declared location is within the vernier-cell region; and

c. applying the network correction data to determine, for each of a plurality of satellites during an epoch: estimated L1 and L2 pseudorange measurements from the satellite to the declared location; and estimated phase delays for L1 frequency, for L2 frequency, and for a frequency representing a frequency difference between the L1 frequency and the L2 frequency.

22. (New) The method of claim 21, further comprising applying the network correction data to determine, for each of a plurality of satellites during an epoch: a calculated satellite position; an atmospheric propagation delay from the calculated satellite position to the declared location; and a position error vector component affecting range at the declared location.

23. (New) The method of claim 22, further comprising applying the network correction data to determine a vernier-cell correction for the declared location, for each of a plurality of satellites during an epoch.

24. (New) The method of claim 23, wherein the vernier-cell correction ν for each satellite is determined as $\nu = a0 + a1 \cdot R \cdot (vrs.lon - vo.lon) \cdot \cos(vo.lat) + a2 \cdot R \cdot (vrs.lat - vo.lat)$

in which

a0, a1, a2 =	error-field coefficients applicable to the vernier-cell region, where a0 is a centroid component, a1 is an east-west slope, and a2 is a north-south slope
R =	radius of the earth
vrs.lon =	longitude of the declared location
vo.lon =	longitude of an origin of the vernier-cell region
cos (vc.lat) =	correction for earth's curvature
vrs.lat =	latitude of the declared location
vo.lat =	latitude of an origin of the vernier-cell region .

25. (New) The method of claim 22, wherein determining atmospheric propagation delay comprises determining from the network correction data a tropospheric propagation delay from the calculated satellite position to the declared location.

26. (New) The method of claim 25, wherein determining atmospheric propagation delay comprises determining from the network correction data an ionospheric propagation delay from the calculated satellite position to the declared location for the GPS L1 frequency, for the GPS L2 frequency, and for the frequency difference between the GPS L1 frequency and the GPS L2 frequency.

27. (New) Apparatus having a processor for synthesizing GPS satellite measurements for a declared location and further comprising:

a. a port for receiving network correction data for an epoch comprising:
   i. Satellite ephemeris data;
   ii. Satellite clock corrections;
   iii. Satellite ephemeris corrections;
   iv. Atmospheric parameters; and
   v. residual error corrections derived from one or more reference stations located within a vernier-cell region;

b. software instructions to determine whether the declared location is within the vernier-cell region;

c. software instructions to apply the network correction data to determine, for each of a plurality of satellites during an epoch: estimated L1 and L2 pseudorange measurements from the satellite to the declared location; and estimated phase delays for L1 frequency, for L2 frequency, and for the frequency difference between the L1 and L2 frequencies.

28. (New) The apparatus of claim 27, further comprising software instructions to apply the network correction data to determine, for each of a plurality of satellites during an epoch: a calculated satellite position; an atmospheric propagation delay from the calculated satellite position to the declared location; and a position error vector component affecting range at the declared location.

29. (New) The apparatus of claim 28, further comprising software instructions to apply the network correction data to determine, for each of a plurality of satellites during an epoch: vernier-cell corrections for the declared location.

30. (New) The apparatus of claim 29, wherein the vernier-cell correction v for each satellite is determined as $v = a0 + a1 \cdot R \cdot (vrs.lon - vo.lon) \cdot \cos(vo.lat) + a2 \cdot R \cdot (vrs.lat - vo.lat)$ in which

a0, a1, a2 =	error-field coefficients applicable to the vernier-cell region, where a0 is a centroid component, a1 is an east-west slope, and a2 is a north-south slope
R =	radius of the earth
vrs.lon =	longitude of the declared location
vo.lon =	longitude of an origin of the vernier-cell region
cos (vc.lat) =	correction for earth's curvature
vrs.lat =	latitude of the declared location
vo.lat =	latitude of an origin of the vernier-cell region .

31. (New) The apparatus of claim 28, wherein the software instructions to determine atmospheric propagation delay comprise software instructions to determine from the network correction data a tropospheric propagation delay from the calculated satellite position to the declared location.

32. (New) The apparatus of claim 31, wherein the software instructions to determine atmospheric propagation delay comprise software instructions to determine from the network correction data an ionospheric propagation delay from the calculated satellite position to the declared location for the GPS L1 frequency, for the GPS L2 frequency, and for a frequency representing a frequency difference between the GPS L1 frequency and the GPS L2 frequency.

33. (New) Apparatus for synthesizing GPS satellite measurements for a declared location, comprising:

a. means for receiving network correction data for an epoch comprising:

i. Satellite ephemeris data;

ii. Satellite clock corrections;

iii. Satellite ephemeris corrections;

iv. Atmospheric parameters; and

v. residual error corrections derived from one or more reference stations located within a vernier-cell region;

b. means for determining whether the declared location is within the vernier-cell region;

c. means for applying the network correction data to determine, for each of a plurality of satellites during an epoch: estimated L1 and L2 pseudorange measurements from the satellite to the declared location; and estimated phase delays for the GPS L1 frequency, for the GPS L2 frequency, and for a frequency representing a frequrency difference between the GPS L1 frequency and the GPS L2 frequency.

34. (New) The apparatus of claim 33, further comprising means for applying the network correction data to determine, for each of a plurality of satellites during an epoch: a calculated satellite position; an atmospheric propagation delay from the calculated satellite position to the declared location; and a position error vector; an error-vector component affecting range at the declared location.

35. (New) The apparatus of claim 34, further comprising means for applying the network correction data to determine, for each of a plurality of satellites during an epoch: vernier-cell corrections for the declared location.

36. (New) The apparatus of claim 35, wherein the vernier-cell correction v for each satellite is calculated as $v = a0 + a1 \cdot R \cdot (vrs.lon - vo.lon) \cdot \cos(vo.lat) + a2 \cdot R \cdot (vrs.lat - vo.lat)$

in which

a0, a1, a2 = error-field coefficients applicable to the vernier-cell region, where a0 is a centroid component, a1 is an east-west slope, and a2 is a north-south slope

R = radius of the earth

vrs.lon = longitude of the declared location

vo.lon = longitude of an origin of the vernier-cell region
cos (vc.lat) = correction for earth's curvature
vrs.lat = latitude of the declared location
vo.lat = latitude of an origin of the vernier-cell region .

37. (New) The apparatus of claim 34, wherein the means for determining atmospheric propagation delay comprises means for determining from the network correction data a tropospheric propagation delay from the calculated satellite position to the declared location.

38. (New) The apparatus of claim 37, wherein the means for determining atmospheric propagation delay comprises means for determining from the network correction data an ionospheric propagation delay from the calculated satellite position to the declared location for the GPS L1 frequency, for the GPS L2 frequency, and for a frequency representing a frequency difference between the GPS L1 frequency and the GPS L2 frequency.

39. (New) A method of determining a corrected GPS position fix, comprising:

a. obtaining network corrections determined from measurements taken at a plurality of GPS reference stations and residual error corrections derived from one or more reference stations located within a vernier-cell region;

b. for each of a plurality of satellites in view at a navigator location, receiving GPS ephemeris data and obtaining GPS receiver measurements;

c. determining, from the GPS ephemeris data and the network corrections and the residual error corrections, calculated corrections appropriate to the navigator location for each of the plurality of satellites;

d. applying the calculated corrections to the GPS receiver measurements to obtain corrected measurements; and

e. computing a position fix from the corrected measurements.

40. (New) The method of claim 39, wherein determining calculated corrections comprises applying the residual error corrections to determine, for each of a plurality of satellites during an epoch: vernier-cell corrections for the navigator location.

41. (New) The method of claim 40, wherein the vernier-cell correction ν for each satellite is determined as $\nu = a0 + a1 \cdot R \cdot (vrs.lon - vo.lon) \cdot \cos(vo.lat) + a2 \cdot R \cdot (vrs.lat - vo.lat)$

in which

a0, a1, a2 = error-field coefficients applicable to the vernier-cell region, where a0 is a centroid component, a1 is an east-west slope, and a2 is a north-south slope

R = radius of the earth

vrs.lon = longitude of the declared location

vo.lon = longitude of an origin of the vernier-cell region

cos (vc.lat) = correction for earth's curvature

vrs.lat = latitude of the declared location

vo.lat = latitude of an origin of the vernier-cell region .

42. (New) Apparatus for determining a corrected GPS position fix, comprising:

a. a GPS receiver to receive GPS ephemeris data and to obtain GPS receiver measurements for each of a plurality of satellites in view at a navigator location; and

b. a navigation processor, responsive to network corrections determined from measurements taken at a plurality of GPS reference stations and residual error corrections derived from one or more reference stations located within a vernier-cell region, to

i. Determine, from the GPS ephemeris data and the network corrections and the residual error corrections, calculated corrections appropriate to the navigator location for each of the plurality of satellites;

ii. Apply the calculated corrections to the GPS receiver measurement to obtain corrected measurements; and

iii. Compute a corrected GPS position fix from the corrected measurements.

43. (New) The apparatus of claim 42, wherein the navigation processor determines the calculated corrections by applying the residual error corrections to determine, for each of a plurality of satellites during an epoch: vernier-cell corrections for the navigator location.

44. (New) The method of claim 43, wherein the vernier-cell correction v for each satellite is determined as $v = a0 + a1 \cdot R \cdot (vrs.lon - vo.lon) \cdot \cos(vo.lat) + a2 \cdot R \cdot (vrs.lat - vo.lat)$

in which

a0, a1, a2 =error-field coefficients applicable to the vernier-cell region, where a0 is a centroid component, a1 is an east-west slope, and a2 is a north-south slope

R = radius of the earth

vrs.lon = longitude of the navigator location

vo.lon = longitude of an origin of the vernier-cell region

cos (vc.lat) = correction for earth's curvature

vrs.lat = latitude of the navigator location

vo.lat = latitude of an origin of the vernier-cell region .

45. (New) Apparatus for determining a corrected GPS position fix, comprising:.

a. receiver means for receiving GPS ephemeris data and obtaining GPS receiver measurements for each of a plurality of satellites in view at a navigator location;

b. processor means, responsive to network corrections determined from measurements taken at a plurality of GPS reference stations and residual error

corrections derived from one or more reference stations located within a vernier-cell region, for

i. Determining, from the GPS ephemeris data and the network corrections and the residual error corrections, calculated corrections appropriate to the navigator location for each of the plurality of satellites;

ii. Applying the calculated corrections to the GPS receiver measurement to obtain corrected measurements; and

iii. Computing a corrected GPS position fix from the corrected measurements.

46. (New) The apparatus of claim 45, wherein the processor means is further operative for determining the calculated corrections by applying the residual error corrections to determine, for each of a plurality of satellites during an epoch: vernier-cell corrections for the navigator location.

47. (New) The method of claim 46, wherein the vernier-cell correction ν for each satellite is determined as $\nu = a0 + a1 \cdot R \cdot (vrs.lon - vo.lon) \cdot \cos(vo.lat) + a2 \cdot R \cdot (vrs.lat - vo.lat)$

in which

a0, a1, a2 = error-field coefficients applicable to the vernier-cell region, where a0 is a centroid component, a1 is an east-west slope, and a2 is a north-south slope

R = radius of the earth

vrs.lon = longitude of the navigator location

vo.lon = longitude of an origin of the vernier-cell region

cos (vc.lat) = correction for earth's curvature

vrs.lat = latitude of the navigator location

vo.lat = latitude of an origin of the vernier-cell region .